

WHAT IS CLAIMED IS:

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1	1. An alloy carbon steel comprising iron and a maximum of 0.35% by		
2	weight of carbon, said alloy carbon steel having a triple-phase microstructure comprising		
3	ferrite crystals fused with martensite-austenite crystals, said martensite-austenite crystals		
4	comprising laths of martensite alternating with thin films of austenite.		
1	2. An'alloy carbon steel in accordance with claim 1 in which said		
2	martensite-austenite crystals are devoid of carbide precibitates at interfaces between		

- An alloy carbon steel in accordance with claim 1 in which 3. martensite-austenite crystals constitute from about 5½ to about 95% by weight of said triple-phase microstructure.
- An alloy carbon steel in accordance with claim 1 in which said martensite-austenite crystals constitute from about 15% to about 60% by weight of said triple-phase microstructure.
- An'alloy carbon steel in accordance with claim 1 in which said 5. martensite-austenite crystals constitute from about 20% to about 40% by weight of said triple-phase microstructure.
- An alloy carbon steel in accordance with claim 1 in which said 6. carbon constitutes from about 0.01% to about 0.35% by weight of said triple-phase microstructure.
- An alloy carbon steel in accordance with claim 1 in which said 7. carbon constitutes from about 0.03% to about 0.3% by weight of said triple-phase microstructure.
- An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.05% to about 0.2% by weight of said triple-phase microstructure.

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phases.

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1	9.	An alloy carbon steel in accordance with claim 1 further		
2	comprising silicon a	at a concentration of from about 0.1% to about 3% by weight of said		
3	alloy composition.			
1	10.	An alloy carbon steel in accordance with claim 1 further		
2	comprising silicon at a concentration of from about 1% to about 2.5% by weight of said			
3	alloy composition.			
1	11.	An alloy carbon steel in accordance with claim 1 in which said		
2	2 carbon constitutes from about 0.03% to about 0.3% by weight of said triple-phase			
3 microstructure, said alloy carbon seel further comprising silicon at a concentration of				
4	from about 0.1% to	about 3% by weight of said alloy composition.		
1	12.	An alloy carbon steel in accordance with claim 1 in which said		
2	carbon constitutes fr	om about 0.05% to about 0.2% by weight of said triple-phase		
3	microstructure, said alloy carbon steel further comprising silicon at a concentration of			
4	from about 1% to about 2.5% by weight of said alloy composition, and containing			
5	substantially no carbides.			
1	13.	A process for manufacturing a high-strength, corrosion-resistant		
2	tough alloy carbon s	teel, said process comprising:		
± 3	(a)	forming an alloy composition comprising iron and at least one		
4		alloying element comprising a maximum of about 0.35% by weight		
5		of carbon in proportions selected to provide said alloy composition		
6		with a martensite transition range having a martensite start		
7		temperature of at least about 300°C;		
8	(b)	heating said alloy composition to a temperature sufficiently high to		
9		cause austenitization thereof, under conditions causing said alloy		
10		composition to assume a homogeneous austenite phase with all		
11		alloying elements in solution;		
12	(c)	cooling said homogeneous austenite phase sufficiently to transform		
13		a portion of said austenite phase to ferrite crystals, thereby forming		
14		a two-phase microstructure comprising ferrite crystals fused with		

austenite crystals; and



16	(d)	cooling said two-phase microstructure through said martensite
17		transition range under conditions causing conversion of said
18		austenite crystals to a microstructure containing laths of martensite
19		alternating with films of retained austenite.
1	14.	A process in accordance with claim 13 in which step (d) comprises
2	cooling said two-phas	se microstructure at a rate sufficiently fast to avoid the occurrence of
3	autotempering.	
1	15.	A process in accordance with claim 13 in which step (d) comprises
2	cooling said two-phas	e microstructure by contact of said two-phase crystal structure with
3	water.	
1	16.	A process in accordance with claim 13 in which step (c) comprises
2	cooling said homogen	eous austenite phase to a temperature of from about 750°C to about
3	950°C.	
1	17.	A process in accordance with claim 13 in which step (c) comprises
2	cooling said homogen	eous austenite phase to a temperature of from about 775°C to about
3	900°C.	
1	18.	A process in accordance with claim 13 in which said carbon
2	constitutes from about	t 0.01% to about 0.35% by weight of said alloy composition.
1	19.	A process in accordance with claim 13 in which said carbon
2	constitutes from about	0.03% to about 0.3% by weight of said alloy composition.
1	20.	A process in accordance with claim 13 in which said carbon
2	constitutes from about	0.05% to about 0.2% by weight of said alloy composition.
1	21.	A process in accordance with claim 13 in which said alloy
2	composition further co	omprises silicon at a concentration of from about 0.1% to about 3%
3	by weight.	
1	22.	A process in accordance with claim 13 in which said alloy
2	composition further co	omprises silicon at a concentration of from about 1% to about 2.5%
3	by weight.	